1970
TECHNICAL DATA COMPANION

NAME

STREET

CITY

STATE

PHONE

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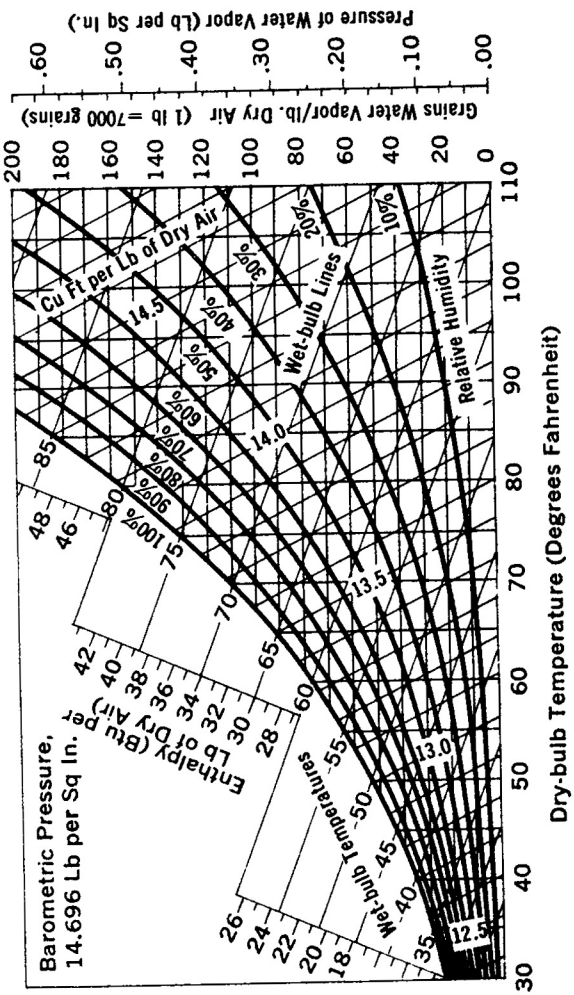
G-E PSYCHROMETRIC CHART



AIR CONDITIONING DATA

Basis for Estimating Operating Cost

Outdoor design temperatures and estimated hours of operation for properly sized residential cooling and heating equipment in typical cities. (From ASHRAE Guide, NWAHACA Data and others).

Winter Design DB Temp. °F	Heating Hours*	City	Cooling Hours**	Summer Design DB Temp. °F	Design Wet Bulb Temp. °F
−10	2250	....Albany, N.Y.	200	90	75
10	1500	....Albuquerque, N.M.	600	96	70
10	1250	....Atlanta, Ga.	750	93	77
8	1750	....Baltimore, Md.	700	91	78
12	1125	....Birmingham, Ala.	1200	95	78
−2	2200	....Boston, Mass.	200	89	74
−10	2000	....Chicago, Ill.	400	92	76
−1	1750	....Cincinnati, Ohio	850	94	78
−2	2100	....Cleveland, Ohio	450	90	75
−3	1750	....Columbus, Ohio	600	91	76
14	1000	....Dallas, Texas	1400	99	78
−10	1750	....Denver, Colo.	350	91	64
−5	2175	....Detroit, Mich.	450	89	75
20	1200	....El Paso, Texas	950	95	69
−5	2000	....Ft. Wayne, Ind.	650	91	76
22	650	....Houston, Texas	1450	94	80
−10	1750	....Indianapolis, Ind.	800	91	77
15	1000	....Jackson, Miss.	1150	96	79
30	750	....Jacksonville, Fla.	1600	94	79
−10	1675	....Kansas City, Mo.	900	96	77
10	1250	....Little Rock, Ark.	1200	97	79
0	1675	....Louisville, Ky.	900	95	78
5	1500	....Memphis, Tenn.	1050	96	79
45	200	....Miami, Florida	1700	90	79
−15	2175	....Milwaukee, Wisc.	350	87	75
−22	2250	....Minneapolis, Minn.	350	90	76
20	750	....Mobile, Ala.	1300	94	80
0	1875	....Newark, N.J.	350	91	76
25	675	....New Orleans, La.	1500	92	80
15	1500	....Norfolk, Va.	1500	92	78
2	1875	....New York, N.Y.	350	91	76
0	1275	....Oklahoma City, Okla. ..	1050	97	77
−15	1875	....Omaha, Neb.	800	94	78
5	1875	....Philadelphia, Pa.	400	91	77
28	1000	....Phoenix, Arizona	1300	107	76
−5	1800	....Pittsburgh, Pa.	400	87	74
15	1375	....Raleigh, N.C.	1050	95	78
−5	2300	....Rochester, N.Y.	350	88	74
−5	1675	....St. Louis, Mo.	1000	95	78
0	2250	....Salt Lake City, Utah....	600	93	66
21	750	....San Antonio, Texas	1300	97	77
0	1375	....Tulsa, Oklahoma	1050	97	78
10	1000	....Tyler, Texas	1350	100	78
6	1750	....Washington, D.C.	900	92	77

*Approximate number of hours a heating plant will operate throughout the season. Based on 70°F indoor temperature.

**Estimated hours requiring cooling. Based on indoor temperature of 80°F for a typical home without excessive solar exposure unless protected by overhang, shades, awnings, etc.

AIR CONDITIONING DATA

Refrigerant Pressure vs. Temperature

In last four columns, figures in bold face are inches vacuum those in roman type are gage pressure in lb per sq in.

ASHRAE Std. Refrigerant

Temp. (Deg F)	R12	R22	R500	R502	(Ammonia) R-717
–25	2.3*	7.4	1.2	12.3	1.3
–20	0.6	10.1	3.1	15.5	3.6
–15	2.4	13.2	5.3	13.1	6.1
–10	4.5	16.4	7.8	22.8	9.0
– 5	6.8	20.0	10.4	26.8	12.2
0	9.2	23.9	13.3	31.2	15.7
5	11.8	28.1	16.4	36.0	19.6
10	14.6	32.7	19.8	41.1	23.8
15	17.7	37.7	23.4	46.5	28.5
20	21.0	43.03	27.3	52.4	33.5
25	24.7	48.7	31.3	58.7	39.0
30	28.5	54.9	36.1	65.4	45.0
35	32.6	61.5	41.0	72.6	52.6
40	37.0	68.5	46.2	80.2	58.6
45	41.7	76.0	51.9	88.3	66.3
50	46.7	84.0	57.8	96.9	74.5
55	52.0	92.6	63.3	106.0	83.4
60	57.7	101.6	70.9	115.6	92.9
65	63.8	111.2	78.1	125.8	103.1
70	70.2	121.4	85.8	136.6	114.1
75	77.0	132.2	93.8	147.9	125.8
80	84.1	143.6	102.5	159.9	138.3
85	91.8	155.6	111.5	172.5	151.7
90	99.8	168.4	121.2	185.8	165.9
95	108.3	181.8	131.2	199.7	181.1
100	117.2	195.9	141.9	214.4	197.2
105	126.6	210.7	153.5	229.9	214.2
110	136.4	226.3	164.9	245.8	232.3
115	146.8	242.7	178.3	262.1	251.5
120	157.7	259.9	190.3	280.3	271.7
125	169.1	277.9	203.0	298.7	293.1
130	181.0	296.8	218.2	318.0	
135	193.5	316.5	233.2	338.2	
140	206.6	337.2	248.8	359.2	

*Inches mercury below one atmosphere

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STANDARD DATA

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CONVERSION FACTORS

TO CONVERT FROM	TO	MULTIPLY BY #
Angstrom unit	centimeters	1.000 E – 08
Atmospheres	mm of mercury at 0° C	7.600 E + 02
	pounds/sq. in.	1.470 E + 01
	kilograms/sq. m.	1.033 E + 04
Atomic mass unit	mass of electron	5.486 E – 04
	mass of proton	1.0073 E + 00
	mass of neutron	1.0087 E + 00
	mass of A particle	4.0029 E + 00
	H_1 atom mass	1.0081 E + 00
Bars	dynes/cm.	1.000 E + 06
Btu*	foot-pounds	7.776 E + 02
	horsepower-hours	3.928 E – 04
	kilopond-meters	1.075 E + 02
	kilogram-calories*	2.520 E – 01
	kilowatt-hours	2.929 E – 04
Btu*/hour	horsepower	3.928 E – 04
Btu*/(hour-sq. ft.)/(°F/in.)	(gram-cal.*/sec.-sq. cm.)/(°C/cm.)	3.445 E – 04
Btu*/minute	foot-pounds/sec.	1.296 E + 01
	horsepower	2.357 E – 02
	kilowatts	1.757 E – 02
Btu*/second	kilopond-meters/sec.	1.075 E + 02
	kilowatts	1.054 E + 00
Btu*/sq. ft.	gram-cal.*/sq. cm.	2.712 E – 01
Centimeters Hg (0°C)	pounds/sq. inch	1.9337 E – 01
	inches of water	5.353 E + 00
Centipoises	pound/foot-hours	2.420 E + 00
Circular mils	square mils	7.854 E – 01
Cubic feet/minute	gallons/second	1.247 E – 01
	cubic cm/sec.	4.720 E + 02
Cubic feet/pound	cu. cm/g	6.243 E + 01
Cubic feet/second	gallons/minute	4.488 E + 02
Cubic meters	cubic feet	3.531 E + 01
Degrees	radians	1.745 E – 02
Degrees/second	revolutions/minute	1.667 E – 01

E is the power of 10 by which the number must be multiplied, i.e., 4.047 E + 03 = 4.047 × 10^3.

*Thermochemical.

TO CONVERT FROM	TO	MULTIPLY BY #
Dynes	grams	1.0197 E – 03
	poundals	7.233 E – 05
Dyne-centimeters	pounds-feet	7.380 E – 08
Dynes/sq. centimeter	atmospheres	9.869 E – 07
Electron volts	gram-calories*	3.829 E – 20
	gram-cal*/mole	2.305 E + 04
	cm^{-1} (wave no.)	8.06 E + 03
	kwh	4.45 E – 26
	microns wavelength	1.240 E + 00
Feet of H_2O at 39.2°F	inches of Hg at 32°F	8.825 E – 01
Foot-pounds	Btu*	1.286 E – 03
	kilowatt-hours	3.766 E – 07
Foot-pounds/sec.	Btu*/min	7.716 E – 02
Gallons (U.S. Liquid)	cubic inches	2.310 E + 02
	cubic feet	1.337 E – 01
Gal/min (of water)	pound/hr of water	5.008 E + 02
Gram-calories*	Btu	3.968 E – 03
Gram-cal*/sq. cm	Btu*/sq. ft.	3.687 E + 00
Gram-cm	Btu*	9.301 E – 08
	ergs	9.807 E + 02
Gram-mole Gas	cubic cm. gas (0°C & 760mm)	2.240 E + 04
Grams	dynes	9.807 E + 02
	pounds	2.205 E – 03
Grams of matter	electron volt	5.61 E + 32
Grams/cu cm	pounds/cu inch	3.613 E – 02
	pounds/cu foot	6.243 E + 01
Grams/sq cm	centimeters of Hg	7.356 E – 02
	atmosphere	9.678 E – 04
	pounds/sq ft	2.048 E + 00
Horsepower (mech)	foot-pounds/sec	5.500 E + 02
	kilowatts	7.457 E – 01
Horsepower hours	Btu*	2.546 E + 03
	joule (abs)	2.685 E + 06
	kilogram-cal*	6.416 E + 02
In of Hg. at 32°F	pounds/sq. in.	4.912 E – 01

E is the power of 10 by which the number must be multiplied, i.e., 4.047 E + 03 = 4.047 × 10^3.

*Thermochemical.

CONVERSION FACTORS

TO CONVERT FROM	TO	MULTIPLY BY #
In of H_2O at 39.2°F (4°C)	centimeters of Hg	1.868 E − 01
	pounds/sq. ft.	5.202 E + 00
Joules (abs)	kilogram-calories*	2.390 E − 04
Kilogram-cal*	horsepower-hours	1.559 E − 03
Kilopond-meter	Btu*	9.301 E − 03
	ergs	9.807 E + 07
Kilowatt hours	average noon sunlight on 1 sq. m.	1.000 E + 00
	Btu*	3.414 E + 03
Kilowatt hours	horsepower hours	1.341 E + 00
Kilowatts	kilogram-cal.*/minute	1.434 E + 01
Liter-atmospheres	Btu*	9.610 E − 02
Liters/kilogram	cubic ft./pound	1.602 E − 02
Liters/minute	cubic feet/sec	5.885 E − 04
	gallons/hour	1.585 E + 01
Lumens	watts+	1.470 E − 03
Newtons	dynes	1.000 E + 05
Newton-meters	joules (abs.)	1.000 E + 00
Pound-Celsius (Centigrade) Unit	Btu*	1.800 E + 00
Pound-mol gas	cubic feet of gas (60°F at 1 atm)	3.794 E + 02
Pounds of H_2O (4°C)	gallons of H_2O	1.198 E − 01
Pounds of H_2O at 64°F	cubic feet of H_2O	1.603 E − 02
Pounds/gallon	grams/cu. cm.	1.198 E − 01
Pounds/sq. in.	atmospheres	6.805 E − 02
Radian	degrees	5.730 E + 01
Radians/sec	revolutions/sec	1.592 E − 01
Torricellis (Torr)	mm of Hg (0°C)	1.000 E + 00
Volt-coulomb	joules	1.000 E + 00
Watt-hour	Btu*	3.414 E + 00
Watts+	foot-lb/minute	4.425 E + 01
	horsepower	1.341 E − 03
	lumens	6.800 E + 02

E is the power of 10 by which the number must be multiplied, i.e., 4.047 E + 03 = 4.047 × 10^3.

*Thermochemical. + Radiant watts at 5550 A°

FACTORS FOR CONVERSION TO INTERNATIONAL SYSTEM (SI) UNITS

Conversion Factors—International System (SI) Units
(from National Bureau of Standards Handbook 102)

TO CONVERT FROM	TO	MULTIPLY BY #
Acceleration		
Ft/sec^2	$meter/sec^2$	3.048 E−01
in/sec^2	$meter/sec^2$	2.540 E−02
Area		
Acre	$meter^2$	4.047 E+03
Ft^2	$meter^2$	9.290 E−02
In^2	$meter^2$	6.452 E−04
$Mile^2$ (statute)	$meter^2$	2.590 E+06
$Yard^2$	$meter^2$	8.361 E−01
Torque		
dyne-cm	newton meter	1.000 E−07
kgf-meter	newton meter	9.807 E+00
lbf-inch	newton meter	1.130 E−01
lbf-foot	newton meter	1.356 E+00
ozf-inch	newton meter	7.062 E−03
Torque/Length		
lbf-ft/in	newton-m/m	5.338 E+01
lbf-in/in	newton-m/m	4.448 E+00
Electricity and Magnetism		
amp hr	coulomb	3.600 E+03
faraday (chem)	coulomb	9.650 E+04
gauss	tesla	1.000 E−04
gilbert	amp-turn	7.958 E−01
maxwell	weber	1.000 E−08
oersted	amp/meter	7.958 E+01
unit pole	weber	1.257 E−07
Energy (Includes Work)		
Btu*	joule	1.054 E+03
calorie*	joule	4.184 E+00
electron volt	joule	1.602 E−19
erg	joule	1.000 E−07
ft-lb-force	joule	1.356 E+00
kilowatt-hr	joule	3.600 E+06
watt-sec	joule	1.000 E+00
Energy/Area Time		
Btu^*/ft^2 min	$watt/meter^2$	1.891 E+02
Btu^*/ft^2 hr	$watt/meter^2$	3.152 E+00
cal^*/cm^2 min	$watt/meter^2$	6.973 E+02

* Thermochemical. # E indicates the power of 10 by which the number must be multiplied, i.e., 4.047 + 03 = 4.047 × 10^3.

TO CONVERT FROM	TO	MULTIPLY BY #
Force		
dyne	newton	1.000 E−05
kg-force	newton	9.807 E+00
oz-force (av)	newton	2.780 E−01
lb-force (av)	newton	4.448 E+00
lb-force (av)	kilogram-force	4.536 E−01
Force/Length		
lb-force/in	newton/meter	1.751 E+02
lb-force/ft	newton/meter	1.459 E+01
Heat		
Btu* in/sec ft² deg F	watt/meter deg K	5.189 E+02
Btu* in/hr ft² deg F	watt/meter deg K	1.441 E−01
Btu*/ft²	joule/meter²	1.135 E+04
Btu*/hr ft² deg F	watt/meter² deg K	5.674 E+00
Btu*/lbm deg F	joule/kg deg K	4.184 E+03
Btu*/sec ft² deg F	watt/meter² deg K	2.043 E+04
cal/cm²	joule/meter²	4.184 E+04
cal/cm² sec	watt/meter²	4.184 E+04
cal/cm sec deg C	watt/meter deg K	4.184 E+02
cal*/g	joule/kg	4.184 E+03
cal*/g deg C	joule/kg deg K	4.184 E+03
Length		
astronomical unit	meter	1.496 E+11
foot	meter	3.048 E−01
inch	meter	2.540 E−02
light year	meter	9.461 E+15
mil	meter	2.540 E−05
mile (statute)	meter	1.609 E+03
yard	meter	9.144 E−01
Light		
ft-candle	lumen/meter²	1.076 E+01
ft-candle	lux	1.076 E+01
ft-lambert	candela/meter²	3.426 E+00
lux	lumen/meter²	1.000 E+00
Mass		
oz mass (av)	kilogram	2.835 E−02
lb-mass (av)	kilogram	4.536 E−01
ton (2000 lbm)	kilogram	9.072 E+02
Mass/Volume (Includes Density)		
lbm/ft³	kilogram/meter³	1.602 E+01
lbm/in³	kilogram/meter³	2.768 E+04
oz mass (av)/in³	kilogram/meter³	1.730 E+03
lb-mass (av)/gal	kilogram/meter³	1.198 E+02
Power		
Btu*/sec	watt	1.054 E+03
Btu*/min	watt	1.757 E+01
Btu*/hr	watt	2.929 E−01

* Thermochemical. # E indicates the power of 10 by which the number must be multiplied, i.e., 4.047 + 03 = 4.047 × 10³.

TO CONVERT FROM	TO	MULTIPLY BY #
Cal*/sec	watt	4.184 E+00
Cal*/min	watt	6.973 E−02
erg/sec	watt	1.000 E−07
ft-lb force/hr	watt	3.766 E−04
ft-lb force/min	watt	2.260 E−02
ft-lb force/sec	watt	1.356 E+00
hp (elec)	watt	7.460 E+02
Pressure (Force/Area)		
atm (760 torr)	newton/meter²	1.013 E+05
bar	newton/meter²	1.000 E+05
dyne/cm²	newton/meter²	1.000 E−01
gram (force)/cm²	newton/meter²	9.807 E+01
in of Hg (60 F)	newton/meter²	3.377 E+03
in of water (60 F)	newton/meter²	2.488 E+02
mm of Hg (0 C)	newton/meter²	1.333 E+02
lb-force/ft²	newton/meter²	4.788 E+01
lbf/in² (psi)	newton/meter²	6.895 E+03
lbf/in² (psi)	kgf/mm²	7.031 E−04
torr (mm Hg, 0 C)	newton/meter²	1.333 E+02
Velocity (Includes Speed)		
ft/hr	meter/sec	8.467 E−05
ft/min	meter/sec	5.080 E−03
ft/sec	meter/sec	3.048 E−01
in/sec	meter/sec	2.540 E−02
mile/hr	meter/sec	4.470 E−01
mile/min	meter/sec	2.682 E+01
mile/sec	meter/sec	1.609 E+03
mile/hr	km/hr	1.609 E+00
Viscosity		
ft²/sec	meter²/sec	9.290 E−02
poise	newton sec/m²	1.000 E−01
lbm/ft sec	newton sec/m²	1.488 E+00
lbf sec/ft²	newton sec/m²	4.788 E+01
stoke	meter²/sec	1.000 E−04
Volume (Includes Capacity)		
bushel (US)	meter³	3.524 E−02
ft³	meter³	2.832 E−02
gallon (US)	meter³	3.785 E−03
inch³	meter³	1.639 E−05
liter (new)	meter³	1.000 E−03
oz (US fluid)	meter³	2.957 E−05
stere	meter³	1.000 E+00
yd³	meter³	7.646 E−01
Volume/Time (Includes Flow)		
ft³/min	meter³/sec	4.719 E−04
ft³/sec	meter³/sec	2.832 E−02
in³/min	meter³/sec	2.731 E−07
gal/min	meter³/sec	6.309 E−05

* Thermochemical. # E indicates the power of 10 by which the number must be multiplied, i.e., 4.047 + 03 = 4.047 × 10³.

GREEK-ENGLISH ALPHABET

Greek		English		Greek		English	
α	A	alpha	a	ν	N	nu	n
β	B	beta	b	ξ	Ξ	xi	x
γ	Γ	gamma	g	o	O	omicron	o
∂	Δ	delta	d	π	Π	pi	p
ϵ	E	epsilon	e	ρ	P	rho	r
ζ	Z	zeta	z	σ	Σ	sigma	s
η	H	eta	e	τ	T	tau	t
θ	0	theta	th	υ	Υ	upsilon	n
ι	I	iota	i	ϕ	Φ	phi	ph
κ	K	kappa	k	χ	X	chi	ch
λ	Λ	lambda	l	ψ	Ψ	psi	ps
μ	M	mu	m	ω	Ω	omega	o

NUCLEAR CONVERSION FACTORS

1 Atomic Mass Unit (AMU) $=1.66042 \times 10^{-24}$ g
$=931.48$ Mev

1 Fission $\equiv$ 200 Mev $\equiv 3.2 \times 10^{-11}$ watt-sec.

1 g $U^{235} \equiv 2.56 \times 10^{21}$ fissionable nuclei
$\equiv$ 20 tons of TNT $\equiv$ 9 tons coal (high efficiency central station plant)

1 g U^{235} in fission $\equiv 8.2 \times 10^{10}$ watt-sec.

1 kw-hr. $\equiv 4.2 \times 10^{-5}$ g U^{235} in fission

1 Megawatt Day (MWD) $\equiv$ 1.05 g U^{235} in fission
$\equiv$ 1.25 g U^{235} destroyed*

1 percent fuel burnup $\equiv 7.3 \times 10^{3}$ MWD/ton**

1 Fermi $=$ 1 Barn (cross section) $= 10^{-24}$ cm^2

1 Rutherford $= 10^{6}$ Disintegrations/sec.

1 Curie $= 3.7 \times 10^{10}$ Disintegrations/sec.

1 Roentgen (r) $=$ X or γ radiation producing 1esu/cm^3 charge of either sign in STP air
$=$ 85 ergs/g of air absorbed energy

1 rad $=$ 100 ergs/g absorbed energy***

*For a typical thermal reactor, taking into account conversion of U^{235} to U^{236}.
**In mixture of fissionable and fertile isotopes.
***Any type of radiation in any material.

SOLAR SYSTEM TERRESTRIAL PLANET DATA

	MERCURY	VENUS	EARTH	MOON	MARS
Orbital Data,					
10^6 mi					
Mean to Sun	36.2	67.2	93.0	0.239*	141.6
Max to Sun	43.6	67.7	94.6		155
Min to Sun	28.7	66.7	91.4		128
Max from Earth	137	160		0.253	249
Min from Earth	49	26		0.221	35
Eccentricity	0.206	0.007	0.017	0.055	0.093
Inclination, deg	7.00*	3.39*	0	5.15*	1.85*
Period, days					
Sidereal (star)....	88	224.7	365.3	27.32	687
Synodic (Earth)..	116	583.9		29.53	780
Velocity, mi/sec....	30	21.8	18.5	0.635	15.0
Max angular diaΔ..	12.5s	65m		31m	25s
Rotational Data					
Period, days	59	243	0.997	27.32	1.026
Velocity, mi/sec#	0.001	0.001	0.29	1.04	0.16
Inclination, deg#..	7	6	23.45	1.53	25.0
General Data					
Diameter, mi	3020	7600	7918	2160	4180
Volume*	0.055	0.879	1.0	0.020	0.149
Mass*	0.054	0.816	1.0	0.012	0.108
Density, g/cm^3	5.4	5.1	5.57	3.34	4.05
Gravity, ft/sec^2	12	28.6	32.2	5.32	12.5
Escape vel, mi/sec	2.6	6.4	6.96	1.48	3.1
Escape vel, mi/hr..	9400	23000	25100	5320	11200
Environment					
Solar constant+ ..	16.0	3.69	1.92		0.83
Atm press, mb	<3	90‡	1013	<0.001	<20
Avg temp, F			41		
Max temp, F#	700	900	171	230	100
Min temp, F#	-440		59	-260	-90

+ Relative to Earth
\# Equatorial
cal/cm^2/min
‡ atmosphere
Δ arc sec(s) or arc min(m)

NATURAL TRIGONOMETRIC FUNCTIONS

Angle	Sin	Tan	Cot	Cos	Deg
0	0.0000	0.0000	∞	1.0000	90
1	0.0175	0.0175	57.2900	0.9998	89
2	0.0349	0.0349	28.6363	0.9994	88
3	0.0523	0.0524	19.0811	0.9986	87
4	0.0698	0.0699	14.3007	0.9976	86
5	0.0872	0.0875	11.4300	0.9962	85
6	0.1045	0.1051	9.5144	0.9945	84
7	0.1219	0.1228	8.1443	0.9925	83
8	0.1392	0.1405	7.1154	0.9903	82
9	0.1564	0.1584	6.3138	0.9877	81
10	0.1736	0.1763	5.6713	0.9848	80
11	0.1908	0.1944	5.1446	0.9816	79
12	0.2079	0.2126	4.7046	0.9781	78
13	0.2250	0.2309	4.3315	0.9744	77
14	0.2419	0.2493	4.0108	0.9703	76
15	0.2588	0.2679	3.7321	0.9659	75
16	0.2756	0.2867	3.4874	0.9613	74
17	0.2924	0.3057	3.2709	0.9563	73
18	0.3090	0.3249	3.0777	0.9511	72
19	0.3256	0.3443	2.9042	0.9455	71
20	0.3420	0.3640	2.7475	0.9397	70
21	0.3584	0.3839	2.6051	0.9336	69
22	0.3746	0.4040	2.4751	0.9272	68
23	0.3907	0.4245	2.3559	0.9205	67
24	0.4067	0.4452	2.2460	0.9135	66
25	0.4226	0.4663	2.1445	0.9063	65
26	0.4384	0.4877	2.0503	0.8988	64
27	0.4540	0.5095	1.9626	0.8910	63
28	0.4695	0.5317	1.8807	0.8829	62
29	0.4848	0.5543	1.8040	0.8746	61
30	0.5000	0.5774	1.7321	0.8660	60
31	0.5150	0.6009	1.6643	0.8572	59
32	0.5299	0.6249	1.6003	0.8480	58
33	0.5446	0.6494	1.5399	0.8387	57
34	0.5592	0.6745	1.4826	0.8290	56
35	0.5736	0.7002	1.4281	0.8192	55
36	0.5878	0.7265	1.3764	0.8090	54
37	0.6018	0.7536	1.3270	0.7986	53
38	0.6157	0.7813	1.2799	0.7880	52
39	0.6293	0.8098	1.2349	0.7771	51
40	0.6428	0.8391	1.1918	0.7660	50
41	0.6561	0.8693	1.1504	0.7547	49
42	0.6691	0.9004	1.1106	0.7431	48
43	0.6820	0.9325	1.0724	0.7314	47
44	0.6947	0.9657	1.0355	0.7193	46
45	0.7071	1.0000	1.0000	0.7071	45
Deg	**Cos**	**Cot**	**Tan**	**Sin**	**Angle**

DECIMAL AND METRIC EQUIVALENTS OF COMMON FRACTIONS OF AN INCH

Fraction	Decimal	Mm	Fraction	Decimal	Mm
1/64	0.01562	0.397	33/64	0.51562	13.097
1/32	0.03125	0.794	17/32	0.53125	13.494
3/64	0.04688	1.191	35/64	0.54688	13.891
1/16	0.06250	1.588	9/16	0.56250	14.288
5/64	0.07812	1.984	37/64	0.57812	14.684
3/32	0.09375	2.381	19/32	0.59375	15.081
7/64	0.10938	2.778	39/64	0.60938	15.478
1/8	0.12500	3.175	5/8	0.62500	15.875
9/64	0.14062	3.572	41/64	0.64062	16.272
5/32	0.15625	3.969	21/32	0.65625	16.669
11/64	0.17188	4.366	43/64	0.67188	17.066
3/16	0.18750	4.763	11/16	0.68750	17.463
13/64	0.20312	5.159	45/64	0.70312	17.859
7/32	0.21875	5.556	23/32	0.71875	18.256
15/64	0.23438	5.953	47/64	0.73438	18.653
1/4	0.25000	6.350	3/4	0.75000	19.050
17/64	0.26562	6.747	49/64	0.76562	19.447
9/32	0.28125	7.144	25/32	0.78125	19.844
19/64	0.29688	7.541	51/64	0.79688	20.241
5/16	0.31250	7.938	13/16	0.81250	20.638
21/64	0.32812	8.334	53/64	0.82812	21.034
11/32	0.34375	8.731	27/32	0.84375	21.431
23/64	0.35938	9.128	55/64	0.85938	21.828
3/8	0.37500	9.525	7/8	0.87500	22.225
25/64	0.39062	9.922	57/64	0.89062	22.622
13/32	0.40625	10.319	29/32	0.90625	23.019
27/64	0.42188	10.716	59/64	0.92188	23.416
7/16	0.43750	11.113	15/16	0.93750	23.813
29/64	0.45312	11.509	61/64	0.95312	24.209
15/32	0.46875	11.906	31/32	0.96875	24.606
31/64	0.48438	12.303	63/64	0.98438	25.003
1/2	0.50000	12.700	1/1	1.00000	25.400

PROPERTIES OF THE ELEMENTS

Element	Symbol	Atomic Number	Atomic† Weight	Density*	M.P. °C	B.P. °C	Chemical** Valence	First Ioniz. Pot. (ev.)
Actinium	Ac	89	(227)	—	1050	—	3	6.9
Aluminum	Al	13	26.98	2.70	660	2450	3	5.98
Americium	Am	95	(243)	11.7	995	—	3,4,5,6	6.0
Antimony	Sb	51	121.75	6.62	630.5	1380	3,5	8.64
Argon	Ar	18	39.95	1.78	−189	−186	0	15.75
Arsenic	As	33	74.92	5.72	—	613	±3,5	9.81
Astatine	At	85	(210)	—	—	—	—	—
Barium	Ba	56	137.34	3.5	714	1640	2	5.21
Berkelium	Bk	97	(249)	—	—	—	3,4	—
Beryllium	Be	4	9.01	1.85	1277	2770	2	9.32
Bismuth	Bi	83	208.98	9.80	271	1560	3,5	7.29
Boron	B	5	10.81	2.34	2030	2550	3	8.30
Bromine	Br	35	79.91	3.12	−7	58	±1,5	11.81
Cadmium	Cd	48	112.40	8.65	320.9	765	2	8.99
Calcium	Ca	20	40.08	1.55	838	1440	2	6.11
Californium	Cf	98	(251)	—	—	—	3	—
Carbon	C	6	12.01	2.25[1]	3727[2]	4830	±4,2	11.26
Cerium	Ce	58	140.12	6.77[3]	804	3257	3,4	5.60
Cesium	Cs	55	132.90	1.90	29	690	1	3.89
Chlorine	Cl	17	35.45	3.21	−101	−35	±1,7,5	13.01
Chromium	Cr	24	52.00	7.19	1875	2665	3,6,2	6.76
Cobalt	Co	27	58.93	8.85[4]	1495	2900	2,3	7.86
Copper	Cu	29	63.54	8.96	1083	2595	2,1	7.72
Curium	Cm	96	(247)	—	1340	—	3	—
Dysprosium	Dy	66	162.50	8.55	1407	2335	3	—
Einsteinium	Es	99	(254)	—	—	—	—	—
Erbium	Er	68	167.26	9.15	1497	2510	3	6.08
Europium	Eu	63	151.96	5.24	826	1597	3,2	5.67
Fermium	Fm	100	(253)	—	—	—	—	—
Fluorine	F	9	19.00	1.70	−220	−188	−1	17.42
Francium	Fr	87	(223)	—	—	—	1	—
Gadolinium	Gd	64	157.25	7.89	1312	3233	3	6.16
Gallium	Ga	31	69.72	5.91	30	2237	3	6.00
Germanium	Ge	32	72.59	5.32	937	2830	4	7.90
Gold	Au	79	196.97	19.32	1063.0	2970	3,1	9.22

NOTES: †$^{12}C=12$
*Solids & Liquids: g/cm³, 20°C. Gases: g/liter (STP).
**Useful valences, most stable stated first.
( )Integral mass of longest lived isotope.

[1]Graphite. Diamond 3.51.
[2]Sublimes
[3]Face-centered cubic
[4]Close-packed hexagonal

PROPERTIES OF THE ELEMENTS (Cont'd.)

Element	Symbol	Atomic Number	Atomic† Weight	Density*	M.P. °C	B.P. °C	Chemical** Valence	First Ioniz. Pot. (ev.)
Hafnium	Hf	72	178.49	13.09	2222	5400	4	6.8
Helium	He	2	4.00	0.18	−270	−269	0	24.58
Holmium	Ho	67	164.93	8.79[1]	1461	2572	3	——
Hydrogen	H	1	1.01	0.09	−259	−253	1	13.59
Indium	In	49	114.82	7.31	156	2000	3	5.78
Iodine	I	53	126.90	4.94	114	183	−1,5,7	10.45
Iridium	Ir	77	192.2	22.5	2454	5300	4,3,6	9.1
Iron	Fe	26	55.85	7.87	1536	3000	3,2	7.87
Krypton	Kr	36	83.80	3.74	−157	−152	0	14.00
Lanthanum	La	57	138.91	6.19[2]	920	3454	3	5.61
Lawrencium	Lw	103	(257)	——	——	——	——	——
Lead	Pb	82	207.19	11.36	327.4	1725	2,4	7.41
Lithium	Li	3	6.94	0.53	181	1336	1	5.39
Lutetium	Lu	71	174.97	9.85	1652	3315	3	6.15
Magnesium	Mg	12	24.31	1.74	650	1107	2	7.64
Manganese	Mn	25	54.94	7.43	1245	2150	2,7,4,6,3	7.43
Mendelevium	Md	101	(256)	——	——	——	——	——
Mercury	Hg	80	200.59	13.55	−38.4	357	2,1	10.43
Molybdenum	Mo	42	95.94	10.22	2610	5560	6,3,5	7.10
Neodymium	Nd	60	144.24	7.00[2]	1019	3127	3	5.46
Neon	Ne	10	20.18	0.90	−249	−246	0	21.56
Neptunium	Np	93	(237)	19.5	637	——	5,6,4,3	——
Nickel	Ni	28	58.71	8.90	1453	2730	2,3	7.63
Niobium	Nb	41	92.91	8.57	2468	4927	5,3	6.88
Nitrogen	N	7	14.01	1.25	−210	−196	−3,5,2	14.53
Nobelium	No	102	(254)	——	——	——	——	——
Osmium	Os	76	190.2	22.57	2700	5500	4,6,8	8.5
Oxygen	O	8	16.00	1.43	−219	−183	−2	13.61
Palladium	Pd	46	106.4	12.02	1552	3980	2,4	8.33
Phosphorus	P	15	30.97	1.83[3]	44	280	5,±3	10.48
Platinum	Pt	78	195.09	21.45	1769	4530	4,2	9.0
Plutonium	Pu	94	(242)	19.0	640	3235	4,6,5,3	5.8
Polonium	Po	84	(210)	(9.24)	254	——	2,4	8.43
Potassium	K	19	39.10	0.86	64	760	1	4.34
Praseodymium	Pr	59	140.91	6.77[2]	919	3212	3	5.48

NOTES: †$^{12}C=12$
*Solids & Liquids: g/cm³, 20°C. Gases: g/liter (STP).
**Useful valences, most stable stated first.
( )Integral mass of longest lived isotope.

[1]Close-packed hexagonal
[2]Hexagonal
[3]White; Red=2.20

PROPERTIES OF VARIOUS METALS AND ALLOYS*

Material & Identification #	Resistivity Microhm-cm	Temp. coeff. of Resis./°C	Density g/cm³	Specific Heat cal/g/°C	Thermal Cond. w/cm-°C	Thermal Expansion ppm/°C†	Melting Point °C
Aluminum, pure	2.65	0.00429	2.70	0.215	2.22	23.6	660
Aluminum, conductor (99.45 Al)	2.8		2.70		2.34	23.6	657
Beryllium	4	0.025	1.85	0.45	1.46	11.6	1277
Bismuth	[2]106.8	0.004	9.80	0.029	0.08	13.3	271
Brass, yellow (65 Cu, 35 Zn)	6.4		8.47	0.09	1.17	20.3	930
Bronze, commercial (90 Cu, 10 Zn)	3.9	0.00186	8.80	0.09	1.88	18.4	1045
Bronze, phosphor (95 Cu, 5 Sn)	11		8.86	0.09	0.71	17.8	1049
Cadmium	[3]6.83	[2]0.0042	8.65	0.055	0.92	29.8	321
Chromium	13.0	[2]0.003	7.19	0.11	0.67	6.2	1875
Cobalt	6.24	0.00604	[1]8.85	0.099	0.69	13.8	1495
Constantan (45 Ni, 55 Cu)	50	±0.00002	8.9	0.094	0.21	14.9	1290
Copper, annealed (IACS)	1.72	0.00393	8.89	0.092	3.94	16.5	1083
Copper, beryllium (97.9 Cu, 1.9 Be)	[5]9		8.23	0.1	[5]0.8	17.8	955
Copper, electrolytic (99.95 Cu, .040)	1.71	0.00397	8.89	0.092	3.90	16.8	1083
Gallium	[3]53.4		5.91	0.079	0.33	18	30
Germanium	[3]46		5.32	0.073	0.58	5.7	937
Gold	2.35	[2]0.004	19.32	0.031	2.97	14.2	1063
Inconel (78 Ni, 15 Cr, 7 Fe)	98.1		8.51	0.109	0.15	11.5	1425
Indium	8.37		7.31	0.057	0.24	33	156
Invar (64 Fe, 36 Ni)	80	0.0012	8.0	0.123	0.11	<0.1	
Iron, pure	9.71	0.0065	7.87	0.11	0.75	11.8	1536
Iron, gray (3.16 Tc, 1.54 Si, 0.57 Mu)			7.15		0.47	10.5	
Lead	20.65	0.00336	11.36	0.031	0.35	29.3	327
Magnesium	4.45	0.0165	1.74	0.245	1.62	27.1	650
Mercury	[7]98.4		13.55	0.033	0.08		−38
Molybdenum	5.2	0.005	10.22	0.066	1.42	4.9	2610
Monel (67 Ni, 30 Cu)	48.2		8.84	[2]0.127	[2]0.26	14.0	1325
Nichrome (80 Ni, 20 Cr)	107.9	0.00009	8.4	0.107	0.134	[4]17.3	1400
Nickel	6.84	[2]0.0069	8.90	[2]0.105	0.92	13.3	1453
Niobium (Columbium)	[2]12.5		8.57	0.065	0.52	7.3	2468
Palladium	10.8	0.00377	12.02	0.058	0.70	11.8	1552
Platinum	10.64	[2]0.00393	21.45	0.031	0.69	8.9	1769
Silicon	[2]10[5]		2.33	0.162	0.84	2.8-7.3	1410
Silver	1.59	0.0041	10.49	0.056	4.18	19.7	961
Steel, carbon (0.4-0.5 C, bal. Fe)	7-12		7.8		0.5	11	1480
Steel, silicon (3 Si, oriented)	50		7.65		0.18		
Steel, stainless, 304	72		7.9	0.12	0.15	9.6	>1150
Steel, stainless, 347	73		8.0	0.12	0.16	9.3	>1400
Steel, stainless, 410	57		7.7	0.11	0.24	6.1	>1480
Tantalum	12.45	[2]0.0038	16.6	0.034	0.54	6.5	2996
Thorium	13	[2]0.0038	11.66	0.034	0.38	12.5	1750
Tin	11.0	[2]0.0047	7.30	0.054	0.63	23	232
Titanium	42		4.51	0.124	[4]0.11	8.4	1668
Tungsten	5.65	0.0045	19.3	0.033	1.66	4.6	3410
Uranium	30		19.07	0.028	0.27	7-14	1132
Zinc	5.92	[2]0.0042	7.13	0.091	1.13	39.7	419
Zirconium	[2]40.0	0.0044	[1]6.49	0.067	0.88	5.8	1852

*at 20°C or ambient
#pure metals if alloy is not stated
†parts per million/°C

[1] close packed hexagonal
[2] at 0°C
[3] ohm-cm
[4] 20-1000 C; 13 at 20 C
[5] depends on processing
[6] at −240°C
[7] at 50° C

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PROPERTIES OF ENGINEERING PLASTICS

NOTE: All properties shown are typical of standard grade resins. In most instances additional grades are available.

MATERIAL	Specific Gravity	Cost cents/in.³	Impact Strength Notched Izod (Ft. lb./in., ⅛")	Tensile Strength psi x 10³	Tensile Modulus psi x 10³	Heat Distortion Temp °F at 264 psi	Dielectric Strength ST ½" thick (V/mil)	Water Absorption % in 24 hrs.
Polycarbonates* (LEXAN®)	1.20	3.47	16	8.5	345	270	410	.15
Nylon 6/6	1.14	3.6	1-2	11.5	425	200	350	1.3
NORYL® Polyphenylene Oxide based thermoplastic resins*	1.06	2.66	2.5	9.6	355	265	550	.06
Acetal	1.42	3.34	1.3	10	520	255	500	.25
ABS	1.04	1.48	3-6	5.9	310	190	400	.30
Polysulfone	1.24	4.50	1.3	10.2	360	345	425	.22
Phenolic*	1.36	1.1	0.3	6.5	1200	350	270	.4
Acrylic	1.18	1.96	0.5	10	450	180	400	.30
Polypropylene (G.P.)	.91	.68	0.4	5.0	170	140	650	.02
Vinyl (Type I)	1.45	1.23	1-2	7.5	415	169	360	.05
Cellulosics (CAB)	1.2	2.7	3-8	5.0	150	180	350	1.8
Silicone Molding Resins*	1.9	15-20	<0.3	4.8	—	610	480	0.5
Chlorinated Polyether	1.4	22.8	0.4	3.5	150	200	500	.01

*Manufactured and sold by the General Electric Company

POPULATION OF IMPORTANT U.S. CITIES

United States (Total Population)—202,549,000

Populations are based upon final 1960 Census figures and later estimates derived from the Census Bureau and state agencies.

( ) Indicates State Population * Indicates State Capital

‡ Indicates City in which General Electric plant or major facility is located

† Indicates Metropolitan Area Population

ALABAMA	**(3,540,000)**	Fullerton	81,700
Birmingham†	644,000	Garden Grove	115,500
Birmingham	348,683	Glendale	135,600
Gadsden	59,327	Hayward	93,400
Huntsville‡	132,050	Huntington Bch.	86,646
Mobile	241,508	Inglewood	91,000
Montgomery*	149,025	Lakewood	81,401
Tuscaloosa	72,279	Long Beach	387,600
ALASKA	**(273,000)**	Los Angeles†	6,675,000
Anchorage	44,237	Los Angeles	2,881,700
Fairbanks	13,311	No. Hollywood‡	(Met. L.A.)
Juneau*	6,797	Merced‡	23,800
ARIZONA	**(1,635,000)**	Norwalk	91,600
Phoenix†	818,000	Oakland‡	385,700
Phoenix*‡	511,000	Ontario‡	61,000
Tucson	236,000	Pasadena	125,000
ARKANSAS	**(1,969,000)**	Pomona	85,979
Fort Smith‡	64,196	Richmond	81,900
Jonesboro‡	24,000	Riverside	136,800
Little Rock*	129,000	Sacramento†	737,000
No. Little Rock	60,979	Sacramento*	263,237
CALIFORNIA	**(19,300,000)**	San Bernardino	102,934
Alameda	79,600	San Diego†	1,136,000
Anaheim	150,400	San Diego	670,000
Berkeley	120,300	San Francisco-Oakland†	2,918,000
Burbank	95,200	San Francisco	756,900
Compton	76,600	San Jose†	885,000
Concord	76,035	San Jose‡	359,602
Downey	97,200	San Leandro‡	74,400
Fremont	88,400	San Mateo	78,600
Fresno	159,300	Santa Ana	142,739
		Santa Barbara	71,400

Santa Clara	83,500
Santa Monica	88,900
So. San Francisco	78,600
Stockton	97,754
Sunnyvale	84,824
Torrance	139,000
Vallecitos‡ (Met. San Jose)	
Whittier	79,131

COLORADO (1,975,000)

Colorado Springs	103,000
Denver†	1,073,000
Denver*	540,000
Pueblo	103,000

CONN. (2,925,000)

Bridgeport‡	155,200
Greenwich	64,500
Hartford†	549,249
Hartford*	161,000
Meriden	55,100
New Britain	85,300
New Haven	148,200
Norfolk‡	2,000
Norwalk	75,400
Plainville‡	15,900
Stamford	108,400
Waterbury	107,900
West Hartford	73,400

DELAWARE (523,000)

Dover*	12,150
Wilmington	86,920

DISTRICT OF COLUMBIA (809,000)

Washington†	2,408,000
Washington*	798,000

FLORIDA (5,996,000)

Cape Canaveral[1]	4,000
Daytona Beach‡	37,395
Fort Lauderdale	125,000
Gainesville‡	29,701
Hialeah	66,972
Hollywood	87,000
Jacksonville†	497,000
Jacksonville	201,030
Miami†	1,061,000
Miami	291,688
Miami Beach	63,145
Orlando	88,135
Pensacola	56,752
St. Petersburg‡	181,298
Tallahassee*	48,174
Tampa	274,970
W. Palm Beach	56,208

GEORGIA (4,511,000)

Albany	64,700
Atlanta†	1,216,000
Atlanta*	498,200
Augusta	85,000
Chamblee‡	11,100
Columbus	127,100
Macon	126,700
Rome‡	33,500
Savannah	135,200

HAWAII (741,000)

Hilo	26,828
Honolulu†	571,000
Honolulu*	353,676

IDAHO (699,000)

Boise*	63,518

ILLINOIS (10,894,000)

Aurora	68,000
Berwyn	55,100
Bloomington‡	38,300
Champaign	55,500
Chicago†	6,689,000
Chicago‡	3,550,404
Chicago Hts.‡	41,100
Cicero‡	73,700
Danville‡	42,900
Decatur‡	38,500
De Kalb‡	30,000
East St. Louis	75,300
Evanston	82,600
Joliet	74,800
Mattoon‡	20,300
Morris‡	7,935
Morrison‡	4,159
Oak Park	61,700
Peoria	130,500
Rockford‡	135,000
Skokie	70,200
Springfield*	90,400
Waukegan	65,500

INDIANA (4,999,000)

Bloomington‡	42,600
Decatur‡	9,200
Evansville	144,400
Fort Wayne‡	178,300
Gary	182,200
Hammond	110,400
Indianapolis†	984,000
Indianapolis*	505,700
Linton‡	5,300
Mount Vernon‡	6,000
Muncie	70,800
Shelbyville‡	14,700
South Bend	135,700
Tell City‡	7,800
Terre Haute	72,200

IOWA (2,753,000)

Burlington‡	31,300
Cedar Rapids	101,550
Council Bluffs	59,350
Davenport	90,850
Des Moines*	212,400
Dubuque	65,200
Sioux City	79,300
Waterloo	82,500

KANSAS (2,275,000)

Kansas City	169,750
Topeka*	120,467
Wichita	281,110

KENTUCKY (3,191,000)

Covington	55,500
Frankfort*	19,400
Lexington‡	79,400
Louisville†	771,000
Louisville‡	389,900
Owensboro‡	45,900
Somerset‡	7,112

LOUISIANA (3,660,000)

Baton Rouge*	169,788
Lafayette	47,671
Lake Charles	71,344
Monroe	59,348
New Orleans†	1,027,000
New Orleans	680,968
Shreveport‡	181,634

MAINE (973,000)

Auburn‡	24,449
Augusta*	21,680
Bangor‡	43,763
Portland	72,566
So. Portland‡	80,000

MARYLAND (3,685,000)

Annapolis*	23,385
Baltimore†	1,854,000
Baltimore‡	939,024
Bethesda	72,333
Dundalk	82,428
Silver Spring	78,973
Wheaton	61,016

MASS. (5,421,000)

Ashland‡	8,698
Boston†	3,205,000
Boston*	616,326
Brockton	83,499
Brookline	53,608
Cambridge	92,677
Chelsea‡	27,098
Everett‡	43,410
Fall River	98,053
Fitchburg‡	43,087

[1]Facility at nearby Cape Kennedy

Holyoke	52,636
Lawrence	69,070
Lowell‡	86,535
Lynn‡	92,653
Malden	56,142
Medford	60,429
New Bedford	100,176
Newton	88,514
Pittsfield‡	56,511
Quincy	87,158
Somerville	86,332
Springfield‡	165,520
Waltham	57,134
Watertown‡	40,115
Worcester	180,341
MICHIGAN	**(8,584,000)**
Ann Arbor	75,613
Bay City	53,529
Dearborn	115,761
Detroit†	3,987,000
Detroit‡	1,743,242
Edmore‡	1,234
Flint	216,611
Grand Rapids	188,120
Holland‡	23,252
Jackson	56,151
Kalamazoo	82,089
Lansing*	131,147
Lincoln Park	53,933
Livonia	62,006
Pontiac	81,688
Roseville	50,195
Royal Oak	80,612
Saginaw	105,978
St. Clair Shores	76,657
Warren	133,032
Wyoming	49,327
MINNESOTA	**(3,582,000)**
Bloomington	50,498
Duluth	106,884
Minneapolis†	1,612,000
Minneapolis	483,872
St. Paul*	313,411
MISSISSIPPI	**(2,348,000)**
Bay St. Louis‡	8,000
Jackson*‡	161,500
Meridian	58,000
MISSOURI	**(4,605,000)**
Independence	84,771
Jefferson City*	28,228
Kansas City†	1,183,000
Kansas City	475,539
St. Joseph	79,673
St. Louis†	2,249,000
St. Louis‡	657,259
Springfield	95,865
University City	51,249
MONTANA	**(701,000)**
Billings	56,000
Great Falls	58,000
Helena*	21,000
NEBRASKA	**(1,435,000)**
Lincoln*	142,717
Omaha†	516,000
Omaha	339,494
NEVADA	**(444,000)**
Carson City*	5,163
Las Vegas	64,405
Reno	51,470
NEW HAMP.	**(685,000)**
Concord*	26,230
Hooksett‡	6,111
Manchester	88,282
Somersworth‡	8,989
NEW JERSEY	**(7,004,000)**
Atlantic City	61,940
Bayonne	74,100
Bloomfield	54,200
Camden	116,050
Clifton	85,190
East Orange	77,860
Elizabeth	117,570
Fair Lawn‡	38,520

Irvington	63,010
Jersey City†	619,000
Jersey City	270,440
Newark†	1,851,000
Newark‡	397,650
Nutley‡	31,940
Passaic	57,270
Paterson‡	148,110
Springfield‡	16,210
Trenton*‡	110,640
Union	56,040
Union City	52,500
Woodbridge	99,090
NEW MEXICO	**(1,003,000)**
Albuquerque‡	288,000
Sante Fe*	34,676
NEW YORK	**(18,078,000)**
Albany*	122,938
Auburn‡	31,691
Binghamton‡	65,492
Brockport‡	6,058
Buffalo†	1,320,000
Buffalo‡	465,686
Elmira‡	40,878
Fort Edward‡	3,737
Hicksville	50,405
Hudson Falls‡	7,752
Levittown	65,276
Mt. Vernon	71,063
New Rochelle	74,105
New York†	11,366,000
New York	8,040,000
Niagara Falls	98,238
Rochester†	804,000
Rochester	291,692
Rome	45,996
Schenectady‡	71,162
Selkirk‡	350
Syracuse†	606,000
Syracuse‡	209,172
Troy	62,984
Utica‡	95,557
Waterford‡	2,749
White Plains	49,702
Yonkers	205,700
NO. CAROLINA	**(5,027,000)**
Asheboro‡	9,449
Asheville	65,405
Charlotte	250,516
Durham	83,370
Goldsboro‡	34,253
Greensboro	152,337
Hendersonville‡	5,911
Hickory‡	22,647
High Point	78,078
Raleigh*	114,418
Wilmington‡	43,266
Winston-Salem	128,042
NO. DAKOTA	**(639,000)**
Bismarck*	30,584
Fargo	49,572
OHIO	**(10,462,000)**
Akron†	650,000
Akron	299,658
Andover‡	1,150
Barberton‡	35,222
Bedford‡	17,755
Bellevue‡	9,044
Blue Ash‡	9,142
Bucyrus‡	13,681
Canton	116,539
Cincinnati†	1,347,000
Cincinnati‡	500,496
Circleville‡	12,657
Cleveland†	2,000,000
Cleveland‡	825,436
Cleveland Hts.	62,634
Columbus†	847,000
Columbus*	544,016
Conneaut‡	15,157
Coshocton‡	14,494
Cuyahoga Falls	52,541
Dayton†	791,000
Dayton	267,403
Dover‡	12,295
Elyria	53,207

Euclid‡	72,537
Evendale‡ (Metro Cinn.)	
Hamilton	79,846
Jefferson‡	2,137
Kettering	67,381
Lakewood	72,687
Lima	56,890
Logan‡	6,752
Lorain	79,943
Mansfield	52,060
Niles‡	20,873
Parma	95,873
Springfield	85,183
Tiffin‡	22,737
Toledo†	657,000
Toledo	391,453
Warren‡	65,303
Willoughby‡	19,753
Worthington‡	9,239
Youngstown‡	164,821

OKLAHOMA	**(2,496,000)**
Lawton	69,047
Okla. City†	585,000
Okla. City*‡	350,419
Tulsa†	433,000
Tulsa	279,101

OREGON	**(1,999,000)**
Eugene	76,200
Portland†	897,000
Portland	384,000
Salem*	66,300

PENN.	**(11,828,000)**
Allentown‡	108,600
Altoona	71,000
Bethlehem	72,700
Bridgeville‡	7,112
Bristol	59,298
Chester	63,200
Erie‡	139,400
Harrisburg*	79,100
Haverford	54,019
Lancaster	56,900
Levittown	68,793
Lower Merion	59,420
Penn Hills	59,317
Philadelphia†	4,664,000
Philadelphia‡	2,079,000
Pittsburgh†	2,372,000
Pittsburgh	555,300
Reading	98,400
Scranton	105,400
Upper Darby	93,158
Valley Forge‡ (Met. Phila.)	
Wilkes-Barre	61,600
York	54,300

PUERTO RICO	**(2,702,000)**
Caguas‡	32,015
Juana Diaz‡	4,618
Mayagüez	50,147
Palmer‡	1,196
Ponce	114,286
San Juan†	588,805
San Juan*‡	432,377
Vega Alta‡	3,182

RHODE ISLAND	**(901,000)**
Cranston	71,913
Newport‡	35,901
Pawtucket	77,538
Providence†	739,000
Providence*‡	187,061
Warwick	77,637

SO. CAROLINA	**(2,603,000)**
Charleston‡	75,940
Columbia*	97,433
Greenville‡	66,188
Irmo‡	359

SO. DAKOTA	**(674,000)**
Pierre*	10,088
Sioux Falls	65,466

TENNESSEE	**(3,888,000)**
Chattanooga	132,247
Hndrsnvl (Metro Nash)	
Knoxville	179,973
Memphis‡	536,585
Murfreesboro‡	21,441
Nashville*	250,887

TEXAS	**(10,873,000)**
Abilene	90,368
Amarillo	137,969
Austin*	186,545
Beaumont	119,175
Corpus Christi	167,690
Dallas†	1,334,101
Dallas	679,684
El Paso	276,687
Fort Worth†	640,414
Fort Worth	356,268
Galveston	67,175
Houston†	1,717,116
Houston‡	938,219
Laredo	60,678
Lubbock	128,691
Midland	62,625
Odessa	80,338
Port Arthur	66,676
San Angelo	58,815
San Antonio†	838,572
San Antonio	587,718
Tyler‡	51,230
Waco	103,462
Wichita Falls	101,724

UTAH	**(1,022,000)**
Ogden	70,197
Salt Lake City*	189,454

VERMONT	**(416,000)**
Burlington‡	35,531
Ludlow‡	1,658
Montpelier*	8,782
Rutland‡	18,325

VIRGINIA	**(4,533,000)**
Alexandria	106,505
Arlington	182,910
Charlottesville‡	37,717
Chesapeake	88,597
Hampton	110,579
Lynchburg‡	56,375
Newport News	128,402
Norfolk-Portsmouth†	650,731
Norfolk	321,770
Portsmouth‡	117,662
Richmond†	484,996
Richmond*‡	219,065
Roanoke	101,832
Salem‡	16,058
Virginia Beach	122,702
Waynesboro‡	17,286

WASHINGTON	**(3,089,000)**
Everett	52,000
Olympia*	20,880
Richland	26,500
Seattle†	1,179,000
Seattle‡	580,000
Spokane	187,000
Tacoma	156,000

WEST VIRGINIA	**(1,798,000)**
Charleston*	85,796
Huntington	83,627
Wheeling	53,400

WISCONSIN	**(4,188,000)**
Green Bay	62,888
Kenosha	67,899
Madison*	126,706
Milwaukee†	1,275,000
Milwaukee‡	741,324
Racine	89,144
Wauwatosa	56,923
West Allis	68,157

WYOMING	**(315,000)**
Casper	41,500
Cheyenne*	45,000

City	Country	Population
Munich	Germany	1,261,000
Nagoya*	Japan	1,954,000
Nanking	China	1,670,000
Naples*	Italy	1,228,000
Novosibirsk	U.S.S.R.	1,064,000
Osaka	Japan	3,100,000
Paris*	France	7,369,000
Peking	China	6,800,000
Prague	Czechoslovakia	1,025,000
Pusan	South Korea	1,425,000
Pyongyang	North Korea	1,221,000
Rangoon*	Burma	1,530,000
Recife*	Brazil	1,056,000
Rio de Janeiro*	Brazil	5,700,000
Rome*	Italy	2,600,000
Saigon	South Vietnam	1,640,000
Santiago*	Chile	2,459,000
Sao Paulo*	Brazil	5,383,000
Seoul	South Korea	4,100,000
Shanghai	China	6,000,000
Sian	China	1,500,000
Singapore*	Singapore	1,914,000
Stockholm*	Sweden	1,262,000
Surabaja	Indonesia	1,008,000
Sydney*	Australia	2,445,000
Taipei	China	1,164,000
Taiyüan	China	1,500,000
Tashkent	U.S.S.R.	1,239,000
Tehran	Iran	2,695,000
Tientsin	China	3,000,000
Tokyo-Yokohama*	Japan	13,788,000
Toronto*	Canada	2,280,000
Tsingtao*	China	1,050,000
Turin*	Italy	1,112,000
Victoria*	Hong Kong	1,034,000
Vienna	Austria	1,637,000
Warsaw*	Poland	2,106,000
Wuhan	China	2,500,000

BROADCASTING FREQUENCY ASSIGNMENTS

AM Radio.....535-1605 kc.....107 channels.....10 kc wide

FM Radio.....88-108 MC.....100 channels.....200 kc wide

VHF Television

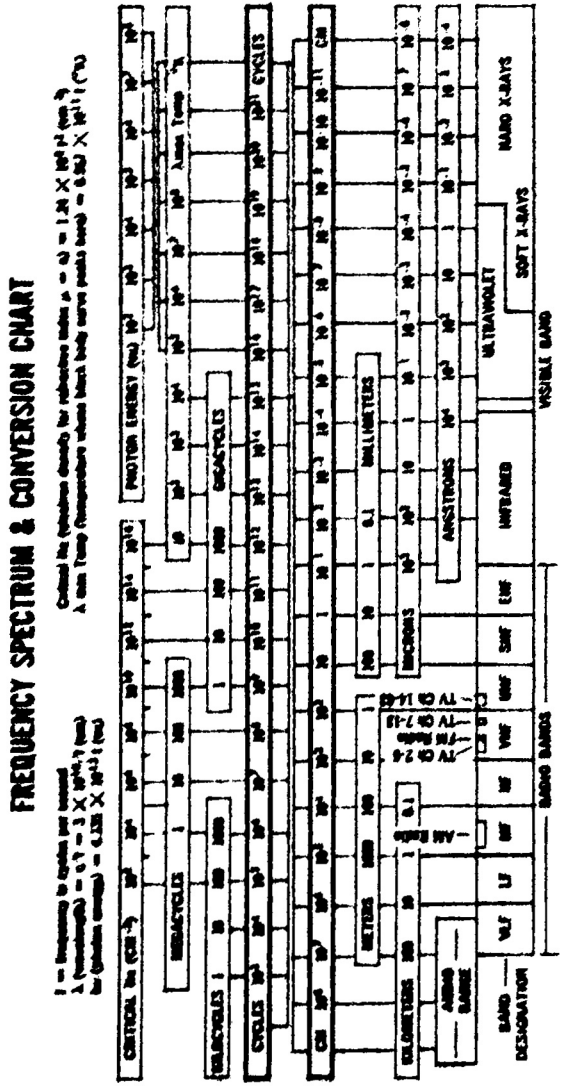
Channel Number	Frequency (Mc)	Channel Number	Frequency (Mc)
2	54-60	8	180-186
3	60-66	9	186-192
4	66-72	10	192-198
5	76-82	11	198-204
6	82-88	12	204-210
7	174-180	13	210-216

UHF Television

470-890 Mc 70 channels 6 Mc wide numbered 14-83

Radio Frequency Band Designation

Designation EIA	Designation JAN	Frequency (Gc)	Wavelength (cm)
WR284	RG-48/U	2.60— 3.95	11.53—7.59
WR187	RG-49/U	3.95— 5.85	7.59—5.12
WR137	RG-50/U	5.85— 8.20	5.12—3.66
WR112	RG-51/U	7.05—10.00	4.25—2.99
WR90	RG-52/U	8.2 —12.4	3.66—2.42
WR62	RG-91/U	12.4 —18.0	2.42—1.66
WR42	RG-53/U	18.0 —26.5	1.66—1.13
WR28	RG-96/U	26.5 —40.0	1.13—0.75
WR22	RG-97/U	33 —50	0.91—0.60
WR15	RG-98/U	50 —75	0.60—0.40
WR12	RG-99/U	60 —90	0.50—0.33



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